Bereskin & Parr
INTELLECTUAL PROPERTY LAW

Appl. No	:	10/806,186	Confirmation No.: 2024
Applicant	:	Milan Graovac et al.	
Filed	:	March 23, 2004	
Title	:	WEIGHTED GRADIENT METHOD AND SYSTEM FOR DIAGNOSING DISEASE	
TC./A.U.	:	3736	
Examiner	:	Jeffrey Gerben Hoekstra	
Docket No.	:	13180-30	
Customer No.	:	001059	

Honorable Commissioner for Patents
P. O. Box 1450
Alexandria, Virginia 22313–1450

AMENDMENT

Sir:

In response to the office action of May 3, 2006, please amend the above-identified application as follows:

Amendments to the Claims are reflected in the listing of claims, which begins on page 2 of this paper.

Remarks/Arguments begin on page 7 of this paper.

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

Claim 1 (original): A method for diagnosing the possibility of disease in a body part, the method comprising

representing the body part with a grid having a plurality of finite elements;

obtaining a set of weights associated with a particular one of the plurality of finite elements using a model of the body part;

computing a diagnostic at the particular finite element, the diagnostic being a function of the set of weights, and a measured electrical property obtained with an electrode array; and

utilizing the diagnostic to diagnose the possibility of disease in the body part.

Claim 2 (original): The method of claim 1, further comprising obtaining a baseline electrical property associated with the body part using the model thereof, wherein the diagnostic is a function of the baseline electrical property, the set of weights, and the measured electrical property obtained with the electrode array.

Claim 3 (original): The system of claim 1, wherein the measured electrical property is conditioned to compute the diagnostic.

Claim 4 (original): The method of claim 1, wherein the measured electrical property is an impedance.

Claim 5 (original): The method of claim 1, wherein, in the step of representing, the grid is a two dimensional grid.

Claim 6 (original): The method of claim 1, wherein, in the step of representing, the grid is a three dimensional grid.

Claim 7 (original): The method of claim 2, wherein the baseline electrical property is obtained using a physical model of the body part.

Claim 8 (original): The method of claim 2, wherein the baseline electrical property is obtained using a control subject.

Claim 9 (original): The method of claim 2, wherein the baseline electrical property is obtained using a finite element method.

Claim 10 (original): The method of claim 9, wherein the baseline electrical property is obtained by

obtaining a baseline voltage; and

using the baseline voltage to compute a baseline impedance.

Claim 11 (original): The method of claim 10, wherein, in the step of obtaining a baseline electrical property, the model of the body part assumes a non-uniform resistivity.

Claim 12 (original): The method of claim 1, further comprising

applying a plurality of electrodes to the body part; and

obtaining a measured electrical property of the body part with the plurality of electrodes.

Claim 13 (original): The method of claim 12, wherein the step of applying includes

applying n_{CI} current injection electrode pairs on the body part, where n_{CI} is an integer greater than zero; and

applying n_{CI} voltage measurement electrode pairs on the body part, each of the current injection electrode pairs associated with one of the n_{CI} voltage measurement electrode pairs.

Claim 14 (original): The method of claim 13, wherein the step of obtaining a measured electrical property includes

injecting a first current between a first pair of the n_{CI} current injection electrode pairs;

measuring the resultant voltage difference V_1^M between the voltage measurement electrode pair associated with the first current injection electrode pair;

repeating the preceding two steps of injecting and measuring with the other electrode pairs until all n_{CI} voltage differences, $\{V_1^M, V_2^M, \ldots, V_{n_{CI}}^M\}$ are obtained; and

using the n_{CI} voltage differences to obtain associated measured impedances, $\{Z_1^M, Z_2^M, \ldots, Z_{n_{CI}}^M\}$, where Z_j^M is the measured impedance obtained by using the j^{th} current injection electrode pair and the voltage measurement electrode pair associated therewith.

Claim 15 (original): The method of claim 14, wherein, if the particular finite element is identified as the k^{th} finite element and the set of weights is denoted by $\{w_{1k}, w_{2k}, \ldots, w_{n_{CI}k}\}$ where w_{ik} is the weight associated with the k^{th} finite element and i^{th} current injection electrode pair, then the step of obtaining a set of weights, , includes

using the model of the body part to obtain a set of current densities, $\{J_{1k}, J_{2k}, \ldots, J_{n_{CI}k}\}$, where J_{ik} is the current density at the k^{th} finite element when current is injected between the i^{th} current injection electrode pair; and

obtaining the set of weights using the relation

$$w_{ik} = \frac{J_{ik}}{\sum_{j=1}^{n_{CI}} J_{jk}}.$$

Claim 16 (original): The method of claim 15, wherein the step of obtaining a baseline electrical property includes

using the model of the body part to obtain a set of baseline impedances $\{Z_1, Z_2, \ldots, Z_{n_{el}}\}$ where Z_i is the impedance associated with the i^{th} electrode pair.

Claim 17 (original): The method of claim 16, wherein the step of computing a diagnostic includes

calculating an average of a function $f(Z_i, Z_i^M)$ at the k^{th} finite element, the average given by

$\langle f_k \rangle = \sum_{i=1}^{n_{el}} w_{ik} f(Z_i, Z_i^M)$, wherein the diagnostic at the k^{th} finite element is defined to be $\langle f_k \rangle$.

Claim 18 (original): The method of claim 17, wherein the function $f(Z_i, Z_i^M)$ is given by

$$f(Z_i, Z_i^M) = \frac{Z_i}{Z_i^M}.$$

Claim 19 (original): The method of claim 17, further comprising

obtaining diagnostics at each of the other finite elements, wherein the step of utilizing the diagnostic includes

averaging the diagnostics at each of the finite elements to find an averaged diagnostic $\langle f \rangle$; and

calculating a second averaged diagnostic, $\langle f_{homo} \rangle$, corresponding to a homologous body part.

Claim 20 (original): The method of claim 19, wherein the step of utilizing the diagnostic further includes calculating a difference $\langle f \rangle - \langle f_{homo} \rangle$, wherein the quantity $|\langle f \rangle - \langle f_{homo} \rangle|$ is indicative of the possibility of disease in the body part or the homologous body part.

Claim 21 (original): The method of claim 19, wherein the step of utilizing the diagnostic further includes calculating a quantity

$$\frac{\langle f \rangle - \langle f_{\text{homo}} \rangle}{\frac{1}{2}\left(\langle f \rangle + \langle f_{\text{homo}} \rangle\right)}$$

that is indicative of the possibility of disease in the body part or the homologous body part.

Claims 22-42 (canceled).

REMARKS/ARGUMENTS

Applicant acknowledges receipt of the Examiner's communication dated May 3, 2006.

In response to the Examiner's Election/Restriction, applicant hereby elects the Group I invention, namely, claims 1-21 for prosecution on the merits in this application. This election is made without traverse. Claims 22-42 are canceled without prejudice or disclaimer. Applicant reserves the right to file a divisional application directed to the subject matter not ultimately patented herein and applicant reserves the right to traverse any Examiner's restriction requirement among Invention II.

Applicant submits that this is a complete response to the Examiner's communication and that the claims of this application are in condition for allowance. Such action is respectfully solicited.

Applicant respectfully requests that a timely Notice of Allowance be issued in this case.

Respectfully submitted,

BERESKIN & PARR

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